

WHAT IS CLAIMED IS:

1. A charging apparatus of a bicycle dynamo comprising:  
a charging element configured and arranged to store electrical energy generated by the dynamo;  
5 a half-wave charging element configured and arranged to be charged with an electrical charge supplied by an output of the dynamo during a first half-cycle of the output of the dynamo;  
a first charging circuit configured and arranged to supply the electrical charge stored in the half-wave charging element to the charging element during a second half-  
10 cycle of the output of the dynamo; and  
a second charging circuit configured and arranged to supply the output of the dynamo to the charging element when a voltage stored in the half-wave charging element is equal to or less than a prescribed voltage during the second half-cycle of the output of the dynamo.  
15
2. The charging apparatus as set forth in claim 1, further comprising  
a switch circuit disposed between the first and second charging circuits and the charging element, the switch circuit being configured and arranged to disconnect the first and second charging circuits from the charging element when a voltage stored in the  
20 charging element is equal to or greater than a predetermined value.
3. The charging apparatus as set forth in claim 2, further comprising  
a switch drive circuit configured and arranged to operate the switch circuit by using the output of the dynamo.  
25
4. The charging apparatus as set forth in claim 3, wherein  
the switch drive circuit comprises  
a switching charging element configured and arranged to supply a  
switching voltage to the switch circuit,  
30 a switching half-wave charging element configured and arranged to be charged with an electrical charge supplied by the output of the

dynamo during one of the first and second half-cycles of the output of the dynamo, and

a switching charging circuit configured and arranged to supply the electrical charge stored in the switching half-wave charging element to the switching charging element during the other of the first and second half-cycles of the output of the dynamo.

5

5. The charging apparatus as set forth in claim 4, wherein the first charging circuit includes a first diode connected between the half-wave charging element and the charging element.

10

6. The charging apparatus as set forth in claim 5, further comprising a second diode disposed between the half-wave charging element and the dynamo configured and arranged to supply the output of the dynamo to the half-wave charging element.

15

7. The charging apparatus as set forth in claim 6, wherein the second charging circuit includes a third diode connected between the dynamo and the charging element.

20

8. The charging apparatus as set forth in claim 1, wherein the first charging circuit includes a first diode connected between the half-wave charging element and the charging element.

25

9. The charging apparatus as set forth in claim 2, wherein the first charging circuit includes a first diode connected between the half-wave charging element and the charging element.

30

10. The charging apparatus as set forth in claim 3, wherein the first charging circuit includes a first diode connected between the half-wave charging element and the charging element.

11. The charging apparatus as set forth in claim 1, further comprising  
a second diode disposed between the half-wave charging element and the dynamo  
configured and arranged to supply the output of the dynamo to the half-wave charging  
element.

5

12. The charging apparatus as set forth in claim 2, further comprising  
a second diode disposed between the half-wave charging element and the dynamo  
configured and arranged to supply the output of the dynamo to the half-wave charging  
element.

10

13. The charging apparatus as set forth in claim 3, further comprising  
a second diode disposed between the half-wave charging element and the dynamo  
configured and arranged to supply the output of the dynamo to the half-wave charging  
element.

15

14. The charging apparatus as set forth in claim 4, further comprising  
a second diode disposed between the half-wave charging element and the dynamo  
configured and arranged to supply the output of the dynamo to the half-wave charging  
element.

20

15. The charging apparatus as set forth in claim 1, wherein  
the second charging circuit includes a third diode connected between the dynamo  
and the charging element.

25

16. The charging apparatus as set forth in claim 2, wherein  
the second charging circuit includes a third diode connected between the dynamo  
and the charging element.

30

17. The charging apparatus as set forth in claim 3, wherein  
the second charging circuit includes a third diode connected between the dynamo  
and the charging element.

18. The charging apparatus as set forth in claim 4, wherein the second charging circuit includes a third diode connected between the dynamo and the charging element.
- 5 19. The charging apparatus as set forth in claim 5, wherein the second charging circuit includes a third diode connected between the dynamo and the charging element.